A0

(12) UK Patent Application (19) GB (11) 2 280 487 (13) A

(43) Date of A Publication 01.02.1995

(21) Application No 9315829.3

(22) Date of Filing 30.07.1993

(51) INT CL[6]
F16F 9/36

(52) UK CL (Edition N )
F2S SBC

(56) Documents Cited
GB 2267131 A EP 0291469 A2 US 4268045 A
US 4231578 A

(58) Field of Search
UK CL (Edition M ) F2S SBC SBS
INT CL[5] F16F 9/36
Online database: WPI

(71) Applicant(s)
Camloc (UK) Limited

(Incorporated in the United Kingdom)

15 New Star Road, Troon Industrial Area, LEICESTER, LE4 7JD, United Kingdom

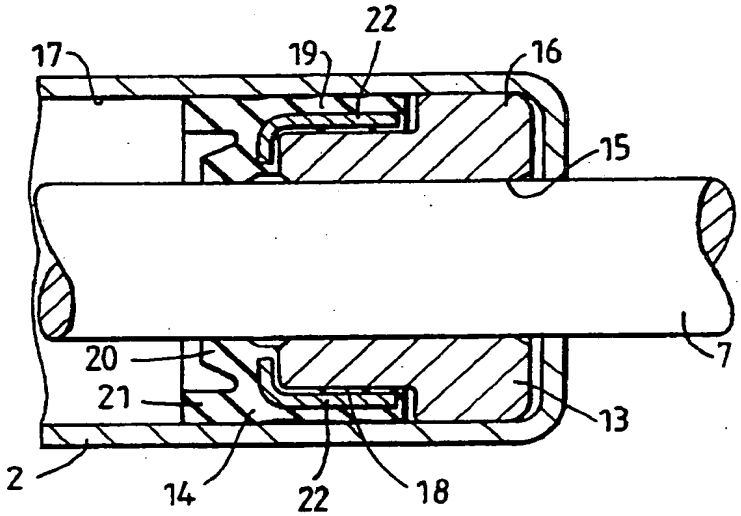
(72) Inventor(s)
Andrew Lee Bools
Peter James Boote
Merrill Karcher

(74) Agent and/or Address for Service
A A Thornton & Co
Northumberland House, 303-306 High Holborn, LONDON, WC1V 7LE, United Kingdom

# (54) Gas springs and seals therefor

(57) A gas spring comprises a body (2) from which a piston rod (7) extends for connection to a member to be acted on by the spring. A seal/guide assembly comprising a bush (13) and seal (14) is provided to guide the piston rod and to form a seal between the piston rod and the body. The bush (13) includes a full diameter portion (16) which locates the bush and a reduced diameter portion (18) with which the seal (14) is frictionally engaged. The seal engages the piston rod by means of a sealing portion (20) and incorporates an extension (21) which extends axially beyond the sealing portion (20) to sealingly engage the body (2) and to act as a buffer for the piston.

Fig.2.




GB 2 280 487 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

Fig.3.

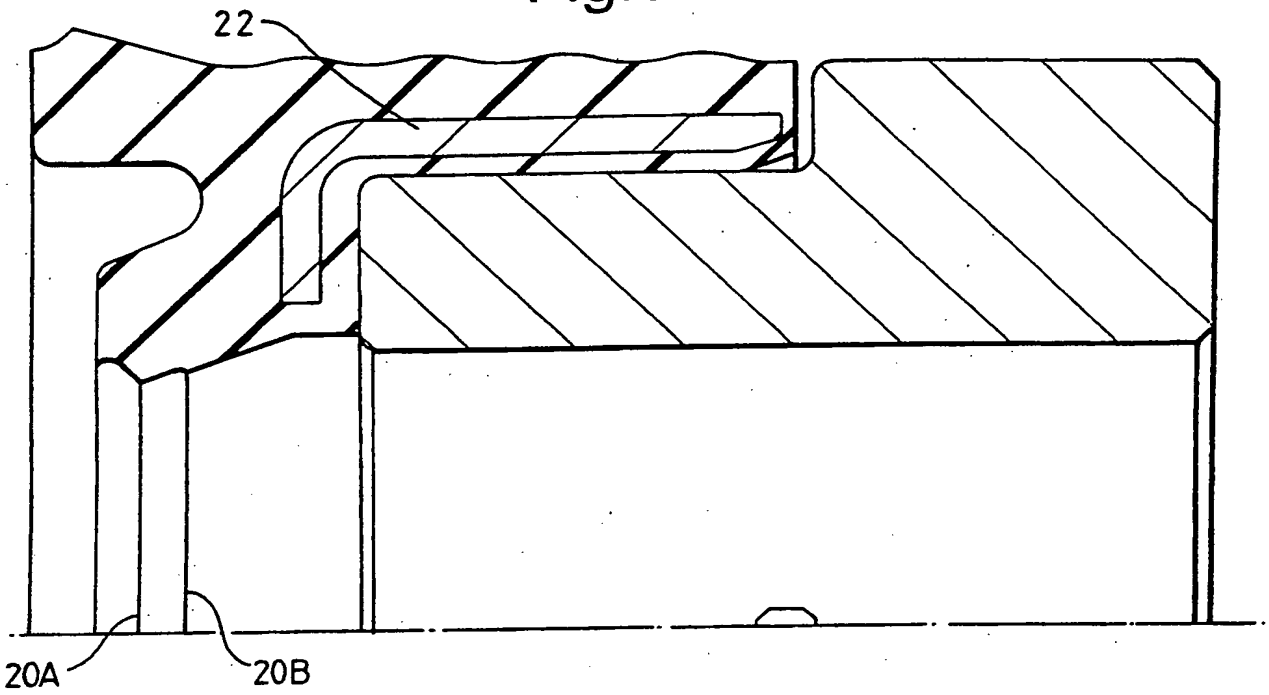
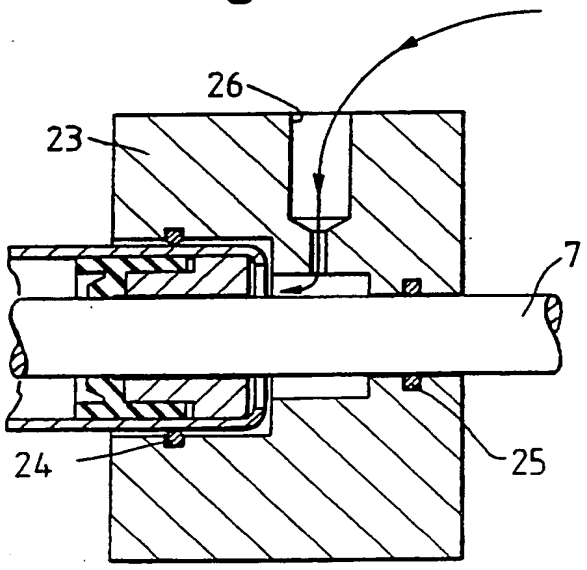



Fig.4.



there is provided a gas spring having a seal/guide assembly comprising a bush which slidably receives the piston rod and has a first portion with an outside diameter which is snugly received within the body and a second portion of reduced outside diameter to form an annular space between the second portion and the body; and a seal mounted on the bush and comprising a first portion which forms a sliding seal with the piston rod and a second portion which is received over the second portion of the bush and has an outside diameter which frictionally engages the adjacent interior of the body.

The bush and seal may be formed as separate components and pre-assembled by locating the second portion of the seal over the second portion of the bush prior to location of the assembly within the gas spring. In the alternative, the seal may moulded onto the bush to form an integral composite seal/guide assembly.

Preferably, the seal incorporates a portion which extends axially into the body beyond the portion of the seal which sealingly engages the piston rod. This extension portion sealingly engages the interior wall of the body and provides a buffer against which the piston will strike when the gas spring is extended to its full stroke. Since the material of the seal will, to an extent, be elastomeric, the buffer portion of the seal will resiliently deform if it is violently struck by the piston thereby reducing shock loading on the piston and the connection between the piston and the piston rod.

Preferably, a rigid ring is moulded within the seal in order to reduce excessive deformation of the seal. By incorporating such a ring the material of the seal can be chosen from a wide range of materials in light of the particular service conditions under which the gas spring is to operate. Typically, the material from which the seal is moulded may be Viton, Nitrile, 90 Duro NBR or similar

rod. The components are separately assembled into the body and, after assembly, are located in position by a groove 12 rolled in the body. The bush 9 guides movement of the piston rod 7; the seal 10 has an inner lip which seals against the piston rod and an outer lip which seals against the body; and the spacer 11 retains the seal 10 in position and acts as a buffer against which the piston 5 strikes if the gas spring is extended to its full stroke.

Referring to Figure 2 the improved seal/guide assembly comprises a bush 13 and a seal 14. The bush has a cylindrical surface 15 which slidingly receives the piston rod 7 and guides movement thereof. The outer diameter of the bush 13 includes a first portion 16 which is snugly received within the bore 17 of the body 2. The bush 13 is made of a rigid material (for example brass, sintered metal, plastics or ceramic material), and accordingly the outside diameter portion 16 ensures that the surface 15 of the bush is correctly located and rigidly held on the centre line of the spring.

The bush 13 also includes a reduced diameter portion 18 over which is mounted an annular portion 19 of the seal 14. The annular portion 19 fills the annular space defined between the bush portion 18 and the wall 17 of the body and the outside diameter of the seal is such that the seal, at this point, frictionally engages the interior surface 17.

In addition to the annular portion 19 the seal 14 incorporates an inner sealing portion 20 which slidingly and sealingly engages the piston rod 7, and an extension portion 21 which sealingly engages the wall 17 of the body and acts as a buffer against which the piston (not shown in Figure 2) will strike if the spring is extended to its full stroke.

Depending on the nature of the material from which the seal 14 is moulded a rigid reinforcing ring 22 of

for example dry nitrogen, is admitted through a port 26 and flows between the piston rod 7 and the bush 13 to lift the seal portion 20 away from the piston rod and enter the interior of the gas spring. It has been found that this charging technique can be operated satisfactorily with the seal/guide assembly of the present invention even though no groove is provided for positively retaining the seal/guide assembly in position.

6. A gas spring according to any preceding claim wherein a rigid ring is moulded within the seal in order to reduce excessive deformation of the seal.

7. A gas spring according to any preceding claim wherein the bush is turned from bar material or moulded from sintered metal, plastics or ceramic material.

8. A gas spring according to any preceding claim wherein the seal sealingly engages the piston rod by way of two adjacent sealing lips which are separated by a zone in which oil is trapped to lubricate the seal.

9. A gas spring according to any preceding claim wherein the spring may be charged by forcing gas and optionally oil between the seal and the piston rod.

10. A gas spring according to any preceding claim wherein the seal/guide assembly is retained in position within the body exclusively by frictional engagement of the seal/guide assembly with the interior surface of the body.